

Stabilizing Drainage Ditches

Man-made drainage ditches with gently sloping bottoms (less than 3%) can be stabilized with thick grass seeding and erosion control blankets (see Section 4). **Natural (i.e., not “man-made”) drainage channels and creeks or streams cannot be cleared, re-routed, or otherwise altered without one or more permits from the U.S. Army Corps of Engineers and the KY Division of Water** (see Section 10). Moderately sloping ditches (3%–6% slopes) will likely require turf reinforcement mats and perhaps some riprap if soils are silty. Steeply sloping ditches (greater than 10%) need heavier armoring with concrete, riprap, gabion baskets, geogrid, retaining walls, or other approved products.

Drainage ditch slopes and soils

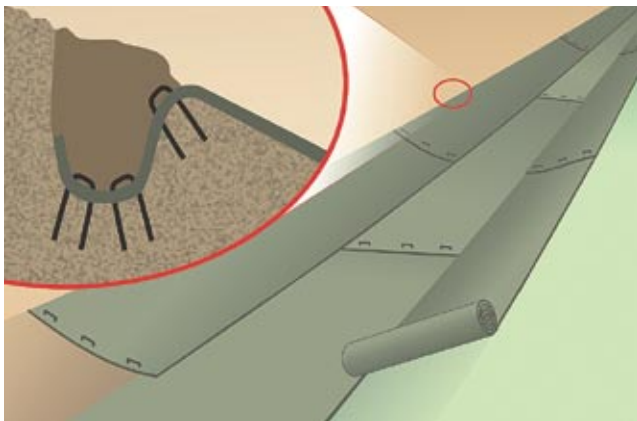
As noted in Section 6, silty soils are the most erodible and clay is the least erodible. Steeper ditches and those with highly erodible soils need more protection. Drainage ditch bank slopes must not exceed 2:1. If tractor mowers or other equipment will cross channels in the future, bank slopes must be 3:1 or flatter. The outlet must be installed, seeded, stabilized, and protected before the ditch receives incoming flows.

Stabilization approaches for drainage ditches

		Soil Type in Ditch		
Ditch Slope		Sandy	Silty	Clays
Steep	>10%	Concrete or riprap	Concrete or riprap	Riprap
Moderate	10%	Riprap with filter fabric	Riprap or turf mats & seeding	Riprap or turf mats & seeding
Slight	5%	Riprap or turf mats & seeding	Seeding & turf mats	Seeding & turf mats
Mostly Flat	<3%	Seeding & blankets	Seeding & mulching	Seeding & mulching

Erosion control blanket and turf mat linings

All ditches steeper than 10% require rock, concrete, or other armored liners and/or grade control structures. Ditches of 10% or less can be stabilized with turf reinforcement mats or erosion control blankets if they are seeded quickly. See Section 4 for installation and other information on turf reinforcement mats, erosion control blankets, and seeding/mulching applications.



Lay in ditch blankets similar to roof shingles; start at the lowest part of the ditch, then work your way up. Uphill pieces lap over downhill sections. Staple through both layers around edges. Trench, tuck, and tamp down ends at the top of the slope. Do not stretch blankets or mats.

Silt check dams of rock, brush, or other products

Drainage ditches need temporary silt check dams to capture sediment and reduce ditch bottom downcutting. Silt dikes or dams can be made of rock, stone-filled bags, fiber rolls, or brush. They are only effective when the drainage area is 10 acres or less.

Silt fencing and straw bales are not approved for use as silt check dams, and must not be used in drainage ditches that carry flowing water. Also, do not place silt checks in creeks or streams. Sediment must be intercepted before it reaches streams, lakes, rivers, or wetlands.

Seed ditches and install silt checks before excavating, filling, or grading uphill areas. Inspect, repair, and clean out sediment from upstream side of silt checks after each rainfall exceeding $\frac{1}{2}$ inch. Remove temporary silt checks after the site is stabilized and vegetation is established. Placing filter fabric under the ditch check during installation will make removal much easier. Stone bag silt checks are easiest to remove, and can be re-used.

Spacing for silt check dams

Ditch slope	Silt check dam spacing	Additional information
30%	10 ft.	Calculated for 3' high silt check dams.
20%	15 ft.	
15%	20 ft.	
10%	35 ft.	Center of dam should be 6" lower than sides.
5%	55 ft.	
3%	100 ft.	Use 5"-10" rock, stone bags, or commercial products.
2%	150 ft.	
1%	300 ft.	
0.5%	600 ft.	

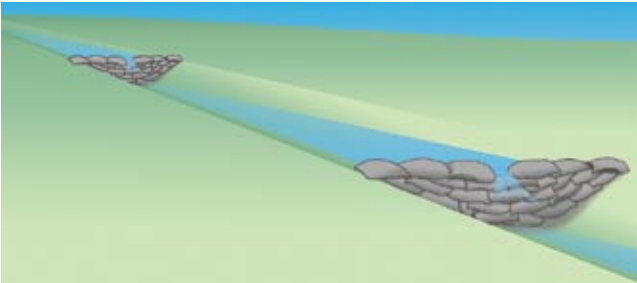
Silt check dams are spaced according to the slope of the ditch bottom (see table). Extend the ends of the silt check to the top of the bank to prevent bypassing and sidecutting. Keep the middle part lower and relatively flat so overflows aren’t too concentrated and bypasses are prevented.

Lining steep ditches

Riprap is used to line sides and bottoms of steep ditches. Rock used in liners is mixed so the spaces between large rocks are filled with smaller rock. See table for rock sizing.

Rock sizing for ditch liners

Flow velocity	Average rock diameter
6 ft. per second	5 inches
8 ft. per second	10 inches
10 ft. per second	14 inches
12 ft. per second	20 inches



Silt check dams of rock, stone-filled bags, or commercial products must be installed before uphill excavation or fill activities begin. See table for correct silt check spacing for various channel slopes. Tied end of bag goes on downstream side.

As ditch depth and steepness increase, rock size must also increase. Line the bare ditch bottom and sides with non-woven filter fabric to prevent undercutting and washouts. If flows are 10 feet per second or more, use #2 rock as a bottom liner, below the larger rock. Rock must be placed along ditch bottom first, then up the sides. Rock layer thickness should be $1\frac{1}{2}$ times the average diameter of the largest fourth of the rocks.

Install a protected outlet first by excavating a $1\frac{1}{2}$ - to 2-foot trench at the toe of the slope and filling with riprap. See Section 7 for details on outlet apron construction. Replace dislodged rock after storms as needed.



Good construction of rip-rap lined ditches on road project. Good use of erosion blankets on slopes. Seed coverage on slopes is fair to poor.



Good installation of temporary rock silt checks. Remember to tie sides of silt check to upper banks. Middle section should be lower. Clean out sediment as it accumulates. Remove silt checks after site and channel are stabilized with vegetation.



Good placement and spacing of fiber-roll silt checks. Coconut fiber rolls and other commercial products can be used where ditch slopes do not exceed three percent.



Poor application of commercial silt check product. Check dam needs to be longer (tied into banks). More are needed, at correct spacing for channel slope. Area needs to be re-seeded; ditch may need blanket liner.



Poor silt check installation. Straw bales are not approved as silt checks for ditch or channel applications due to rotting, installation difficulties, and high failure potential.

Installing Sediment Traps and Basins

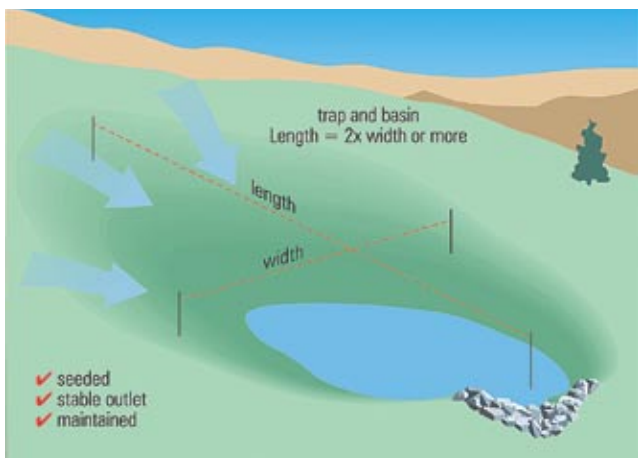
The purpose of a trap or basin is to provide an area where muddy runoff is allowed to pool, so sediment will settle out. Sediment traps and basins are installed in natural drainage areas before excavation or fill work begins. **Do not depend on sediment traps and basins alone to control sediment loss from your construction site.** Other uphill controls on bare areas, slopes, and in ditches and channels are needed to prevent overloading traps and basins.

Containment for the pooling area can be an excavated hole or a dike made of earth or stone. Straw bales and silt fencing are not approved for use as containment structures for concentrated runoff flows.

Locations for traps and basins

Low-lying sites on the downhill side of bare soil areas where flows converge are ideal places to install temporary sediment traps and basins. In general, sediment traps are designed to treat runoff from about 1 to 5 acres. Sediment basins are larger, and serve areas of about 5 to 10 acres. Basins draining areas larger than 10 acres require an engineered design, and often function as permanent storm water treatment ponds after construction is complete.

Do not put sediment traps or basins in or next to flowing streams or other waterways. Make sure pooled water does not flood buildings, roadways, or other structures.



Sediment traps

Any depression, swale, or low-lying place that receives muddy flows from exposed soil areas can serve as a sediment trap. Installing several small traps at strategic locations is often better than building one large basin. The simplest approach is to dig a hole or build a dike (berm) of earth or stone where concentrated flows are present. This will help to detain runoff so sediment can settle out. The outlet can be a rock-lined depression in the containment berm.

Sediment basins

Sediment basins are somewhat larger than traps, but the construction approach is the same (see below). Sediment basins usually have more spillway protection due to their larger flows. Most have risers and outlet pipes rather than rock spillways to handle the larger flows.

Sediment basins are often designed to serve later as storm water treatment ponds. If this is the case, agreements are required for long-term sediment removal and general maintenance. Construction of a permanent, stable outlet is key to long-term performance.

Sizing and design considerations

A minimum storage volume of 134 cubic yards per acre of exposed soil drained is required for basins and traps. Traps and basins are designed so that flow paths through the trap or basin are as long as possible, to promote greater settling of soil particles. Sediment basin length must be twice the width or more if possible—the longer the flow path through the basin, the better.

Side slopes for the excavation or earthen containment berms are 2:1 or flatter. Berms are made of well-compacted clayey soil, with a height of 5 feet or less. Well mixed rock can also be used as a containment berm for traps. Place soil fill for the berm or dam in 6" layers and compact. The entire trap or basin, including the ponding area, berms, outlet, and discharge area, must be seeded and mulched immediately after construction (see Section 5).

An overflow outlet can be made by making a notch in the containment berm and lining it with rock. Rock

in the notch must be large enough to handle overflows, and the downhill outlet should be stabilized with rock or other flow dissipaters similar to a culvert outlet. Overflow should be at an elevation so dam will not overtop. Allow at least one foot of freeboard. Outlets must be designed to promote sheet flow of discharges onto vegetated areas if possible. If the discharge will enter a ditch or channel, make sure it is stabilized with vegetation or lined (see Section 8).



Sediment basins often have pipe risers, but well-constructed rock overflow outlet notches in the dam or retaining berm are acceptable if the overflow area is protected from erosion.

If used, outlet risers and discharge pipes must be 12 inches diameter or larger. Corrugated metal pipe works best for risers. Plastic or other pipe can also be used for temporary applications. Risers should be topped with trash racks and anti-vortex baffles, and have $\frac{1}{2}$ -inch holes every 3 to 6 inches apart. Large holes or slots, if used, should not appear in the lower two-thirds of the riser. Risers should be anchored to a concrete base, and should be bedded in a pile of 1- to 5-inch rock to a height of at least 2 to 3 feet to promote sediment filtration during draindown. Riser tops must be at least 2 feet below the top of the containment berm or dike. If risers or outlet pipes that do not comply with these design criteria are used for temporary applications, inflows must pass through a filter made of mixed rock piled around the pipe. Rock should be removed after upland area is well vegetated.

Inspection and maintenance

Inspect inlets, berms, spillway, and outlet area for erosion after each rain exceeding 0.5 inch (0.1 inch for KYTC projects). Repair gullied areas and any upslope areas contributing large volumes of sediment. Clean trash and plugged areas from the riser pipe. Repair and reseed bare areas. Ensure that downstream receiving area is stable. Remove sediment before it fills half the trap or basin volume.



Fair installation of two traps above small pond. Dikes are a little too small; placement is too close to pond. Area needs seed and mulch.



Fair sediment trap construction. Rock dike is undersized and lacks a defined overflow notch. Poor maintenance attention. Silt fence beyond rock dike is not needed—silt fence should not be used across flow channels.



Good sediment trap installation, but poor maintenance has caused trap to fill and bypass to occur. Remove sediment before trap is half full. Make sure containment dike has an overflow notch to control the discharge location.

Good trap location; needs cleaning out. Trap might be too small for area drained. Very good channel protection, seeding, and mulching.



Fair to poor trap installation. Dike overflow notch is too deep; basin is too small. No seed or mulch covering bare soil areas.



Poor sediment trap construction. Dike is poorly built, without an overflow notch. Placement is too close to pond. No seeding or mulching evident in drainage area.

Protecting Stream Channels, Wetlands, and Lakes

Streams must not have sediment control devices or stabilization structures placed into them without one or more permits. The Kentucky Division of Water uses solid or dashed blue lines on a USGS topo map to identify a stream. The U.S. Army Corps of Engineers defines any waterway with a defined bed and bank to be a stream and regulated by the U.S. Clean Water Act, *even if it only has water flowing in it during or immediately following rain* (see Section 12 and Appendix C).

Setback requirements

Avoid activities near waterways if possible. Maintain vegetation along buffers by establishing setbacks (see table for recommendations). Flag off vegetated buffer areas to keep equipment away. Some jurisdictions have mandatory setback requirements. Check with the local planning and zoning office before working near waterways.

Need information on permits required for working in or near streams and wetlands in Kentucky?

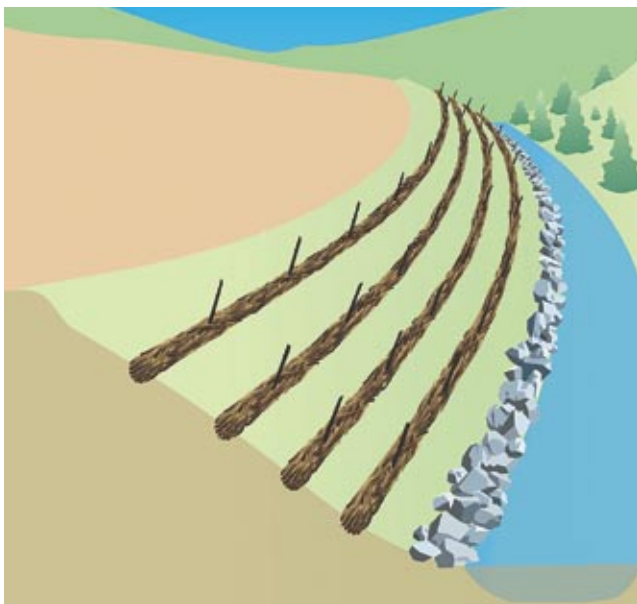
Call 502-564-3410 and ask for the Water Quality Certification Section

Recommended setbacks from waterways

	Soil Type Along Banks		
Bank Slope	Sandy	Silty	Clays
Very Steep (2:1 or more)	100 ft.	80 ft.	60 ft.
Steep (4:1 or more)	80 ft.	60 ft.	40 ft.
Moderate (6:1 or more)	60 ft.	40 ft.	30 ft.
Mostly Flat (less than 10:1)	40 ft.	30 ft.	20 ft.

Vegetated buffers

Preserve existing vegetation near waterways wherever possible. This vegetation is the last chance barrier to capture sediment runoff before it enters the lake, river, stream, or wetland. Where vegetation has been removed or where it is absent, plant native species of trees, shrubs, and grasses. Use live stakes or cuttings to save on planting costs (see next page).



Live willow or hardwood stakes driven through live wattles or rolls, trenched into slope, provide excellent stream bank protection. Protect toe of slope with rock or additional rolls or wattles.

Stream bank stabilization

Stream banks are likely to erode if:

- Vegetation has been removed
- Bank slopes are steeper than 3:1
- Outside curves are not protected
- Runoff increases in the drainage area

Removal of vegetation should be avoided if at all possible. Bank slopes can be cut back and replanted if severe erosion is occurring. Outside channel curves might need protection with large rock, imbedded root wads, logs, gabions or other material if banks are collapsing. Note that work in and around a stream will likely require one or more permits. Environmental impacts are regulated by the U.S. Clean Water Act Sections 401 and 404. In addition, KRS 151 regulates the flooding impacts of building in the floodplain and stream (see Appendices for details).

Increased runoff in the drainage area, caused by new roads, parking lots, roofs, etc. can be addressed by promoting infiltration at every available opportunity. Direct roof gutters, parking lot discharges, and other runoff onto grassy swales and vegetated or landscaped areas, rather than into ditches or creeks.

Unstable or bare stream banks can be stabilized with willow or hardwood cuttings harvested from vegetated areas near the site. Live stakes are 1- to 3-foot long cuttings from live hardwood trees or shrubs. Stakes are harvested during the dormant season (November–February) and driven into the stream bank, right-side up. They will develop roots and grow if sufficient moisture is available and they are not heavily damaged during installation. Willow, maple, poplar, cottonwood, dogwood, sycamore, oak and other hardwoods can be used. Plant half of the stake or cutting below the ground surface. Push into the ground where soils are soft; make a pilot hole with wooden or metal stake if soil is very hard. **Make sure the bottom end—nearest to the roots—is put into the ground!** Stakes or cuttings can be harvested and rooted in cool damp sand mixed with moist compost prior to planting if desired. Cover roots with at least 1 to 2 inches of soil when planting. Keep soil moist during dry season, until plants are well established.

Wattles are also effective in stabilizing stream banks. Wattles are bundles of live cuttings approximately 4 to 6 inches in diameter and 6 feet long. They are placed across the slope at 3- to 5-foot intervals, in long rows. Wattles are laid in shallow trenches, staked down, and covered with 2 to 3 inches of soil. Shoots and roots will sprout along the entire length of the wattle, creating a continuous erosion barrier and stabilizing the bank.

Stream crossings

Note that work in and around a stream will likely require one or more permits. Environmental impacts are regulated by the U.S. Clean Water Act Sections 401 and 404. In addition, Kentucky KRS 151 regulates the flooding impacts of building in the floodplain and stream (see Appendices for details). Keep equipment away from and out of streams. If a temporary crossing is needed, put it where the least stream or bank damage will occur. Look for:

- Hard stream bottom areas
- Low or gently sloping banks
- Heavy, stable vegetation on both sides

Use one or more culverts (18 inches minimum) as needed, sized to carry the two-year 24-hour rain

storm. Cover culverts with at least 12 inches of soil and at least 6 inches of mixed #2 and #57 rock. A 25-foot long, 6" thick pad of rock should extend down the haul road on each side of the crossing, similar to a construction entrance (see Section 2). Remove culverts and cover material when crossing is no longer needed. Grade, seed, or otherwise re-plant vegetation removed. See Section 12 and Appendices C and D for permit information if culverts are placed in streams.



Good use of silt fence, straw, rock, and other practices for temporary stream crossing. Any work in stream channels—such as installation of culverts—requires a Section 404 permit from the U.S. Army Corps of Engineers and a Section 401 Water Quality Certification from the KY Division of Water.



Excellent soil coverage at stream bank stabilization project using hand scattered straw, jute matting, and erosion blanket.

Maintaining and Closing Out Your Construction Project

Erosion and sediment controls need to be inspected and maintained. Temporary controls must be removed and permanently stabilized when the project is completed. Failing to fill, grade, and seed temporary sediment traps or basins or failing to remove silt fences, silt check dams, and other controls can result in legal liabilities and KPDES storm water permit violations. See details of the storm water KPDES construction permit and the Appendices for more information on post-construction closeout requirements.

Inspecting storm water flow structures

Erosion and sediment controls must be inspected weekly and after each rain exceeding 0.5 inch (0.1 inch for KYTC projects). Keep records of inspection observations and actions taken, and file with other erosion and sediment control plan paperwork.

Keep erosion and sediment controls in good working order until the project is completed. Brush and other debris should be removed from culvert and channel inlets. Rock or sediment accumulating behind silt fences or other sediment filters should be removed regularly. All structures that have become dislodged or damaged (such as silt fences, rock aprons, etc.) should be repaired as soon as possible.

Managing trash, supplies, and materials

Keep rock entry/exit pads clean by raking/grubbing or adding new rock as needed when sediment begins to fill spaces between the rock. Make sure that waste materials, building materials, and supplies are properly tied down or contained so that wind and storm water runoff cannot carry the materials away. **Keep your site clean!** Chemicals, paints, and hazardous waste products should be stored in a trailer or other structure to avoid spills and runoff. Provide for proper sewage disposal.

Have a plan to handle fuel, oil, or other spills. Have spill kits and containment material on-site, especially near fueling or equipment service areas. Try to

maintain vehicles and equipment away from the site if possible. If maintenance must occur on-site, ensure that spills are cleaned up quickly.

Vegetated cover considerations for close-out

No site is closed out properly until vegetation is established on all bare soil areas and ditches are stable. Check seeded areas, and reseed areas where vegetation is thin or absent. This is especially important for slopes, ditches, and channels.

Removing temporary sediment controls

When project is completed:

- Remove all silt fencing and stakes. Grade out and seed or remove accumulated sediment or broadcast over grassed areas or dispose of off-site.
- Culvert inlets should be stabilized, vegetated, and showing no visible gullies. Rock or soil that has been washed away by runoff or upstream flows should be replaced. Brush or other debris that could clog inlets should be removed.
- Check ditches and channels to make sure banks and ditch bottoms are well vegetated. Reseed bare areas and replace rock that has become dislodged.
- Check areas where erosion control blankets or matting was installed. Cut away and remove all loose, exposed material, especially in areas where walking or mowing will occur. Reseed all bare soil areas.
- Replace rock washouts near culvert and channel outlets. Fill, grade, and seed or riprap eroded areas around inlets and outlets. Make sure downstream ditches and channels are fully vegetated. Fill and seed any gullies along the banks or other slopes.
- Fill in, grade, and seed all temporary sediment traps and basins that have been removed. Double the seeding rate where runoff flows might converge or high velocity flows are expected.
- Remove temporary stream crossings and grade, seed, or re-plant vegetation removed during crossing installation.

Final site stabilization

Make sure all subcontractors have repaired their work areas prior to final closeout. Conduct a final inspection of all work areas, vegetation, storm water flow structures, and downstream receiving waters to make sure no visible gullies or sediment movement is evident. Notify site owner or manager after all temporary erosion and sediment controls have been removed and final stabilization has been completed. If the site is one acre or larger and covered under a KPDES Storm Water Permit, submit a Notice of Termination to the Kentucky Division of Water (see <http://www.water.ky.gov/permitting/wastewaterpermitting/KPDES/storm/>).



Excellent installation of rock flow dissipater at culvert outlet. Make sure inlets, outlets, and slopes are well stabilized before leaving the site and filing your “Notice of Termination” for ending permit coverage.



Poor job of seeding and protecting curb inlet with stone bags. Project should not be closed out until all bare soil areas are vegetated and all temporary controls (inlet dams, silt checks, silt fencing) have been removed. File “Notice of Termination” with the KY Division of Water when project is completed.

Regulatory Information

Storm water permits

Construction projects one acre or larger **must** be covered by a federal Clean Water Act *Storm*

Need information on Storm Water Permits?

Call 502-564-3410; Ask for the KPDES Division

Or visit this Internet site:

<http://www.water.ky.gov/permitting/wastewaterpermitting/KPDES/>

Water KPDES permit. The permits are issued by the Kentucky Division of Water. If a project smaller than one acre is part of a larger development that exceeds one acre, it also must be covered by a KPDES permit as of March 10, 2003. Following the erosion and sediment control recommendations in this guidebook will help you meet most of the permit requirements. **The main goal of the entire permit program is to keep sediment and other pollutants out of lakes, rivers, streams, and wetlands.** For more details on permit requirements, see Appendix A of this guide.

Erosion protection and sediment control plans

If you're working in Jefferson County, Fayette County, Northern Kentucky, or other designated urban areas, you need to file an erosion and sediment control plan with the local government before you begin work. The plans require you to note which of the erosion and sediment control measures you will use during construction. Plans are also required for Kentucky Transportation Cabinet construction projects. See Appendices of this guide for specific plan requirements and inspection checklists.

If you are working elsewhere in the state and your project is one acre or larger, you have to develop a written erosion and sediment control plan as part of your overall "Storm Water Pollution Prevention (BMP) Plan." These plans do not have to be filed, but must be available at the construction site for review by contractors, subcontractors, and regulatory staff.

Utility construction regulations

In general, utility construction crews and other subcontractors are responsible for their own erosion

and sediment controls. General contractors should make sure that all utilities and subcontractors use rock pad construction entrances. Tracking mud out onto paved roads can lead to legal liabilities. If crews disturb areas that have already been stabilized, they should replace any mulch, sod, seed, blanket, matting, rock, or other material disturbed. Failure to properly grade, seed, and stabilize work sites may violate permit requirements.

If your project is larger than one acre and covered under a KPDES Storm Water Permit, it is recommended that subcontractors and others conducting excavation or fill activities sign an agreement that they will follow the Storm Water Pollution Prevention (BMP) Plan. If utility projects are conducted in or near streams, Clean Water Act Section 404 permit coverage may be required (see next subsection).

Transportation project regulations

The Kentucky Transportation Cabinet (KYTC) inspection performance standard for erosion and sediment control is that no sediment should leave the site. KYTC requires that slopes 4:1 or steeper with upland runoff areas exceeding 100 feet and all channels be lined with erosion control blankets. **All KYTC projects are subject to KPDES Storm Water Permit requirements.** The Cabinet requires that inspection of erosion and sediment controls be conducted at least weekly and after each rain of 0.1 inch or more. If transportation projects are conducted in or near streams, Clean Water Act Section 404 permit coverage may be required (see below).

KYTC standards also limit the amount of disturbed area to 750,000 square feet (about 17.2 acres). Written approval from the district engineer is required for exceeding this limit.

Bridge construction/repair and other work near streams require substantial erosion and sediment control efforts. Establish final grade quickly on as much of the site as possible, then stabilize with seed, mulch, blankets, or matting. Bare soil areas at temporary grade should also be seeded and mulched if they will not be worked over 21 consecutive days. See Appendix F for more information on transportation project requirements.

Section 404 permits for wetlands and streams

Activities conducted in or through streams or wetlands require a separate permit under Section 404 of the Clean Water Act, which regulates the placement of dredged or fill material into public waters. If equipment will be operating in or through a creek, wetland, or river, permit coverage is required. See the box below for a list of the permits issued by the U.S. Army Corps of Engineers under the Section 404 permits:

- Structures in Canals
- Maintenance Activities
- Survey Activities
- Outfall Structure O&M
- Temporary Rec. Structures
- Utility Line Activities
- Bank Stabilization
- Linear Transportation Projects
- Hydropower Projects
- Minor Discharges
- Minor Dredging
- Surface Coal Mining Activities
- Structural Discharges
- Stream/Wetland Restoration
- Marina Modifications
- Single-family Housing
- Flood Control Facilities O&M
- Construction & Access
- Dredging of Existing Basins
- Boat Ramps
- Waste Cleanup Operations
- Development on Waterways
- Agricultural Activities
- Reshaping Drainage Ditches
- Recreational Facilities
- Storm Water Management Facilities
- Mining Activities

See Appendix C for contact information regarding Section 404 permits.



Kentucky Division of Water Regional Offices and Supervisors:

Bowling Green: Bill Baker (270) 746-7475
Columbia: Sara Sproles (270) 384-4734
Florence: Todd Giles (859) 525-4923
Frankfort: Massoud Shoa (502) 564-3358
Hazard: Ferris Sexton (606) 435-6022
London: Keith Blair (606) 878-0157
Louisville: Mike Mudd (502) 425-4671
Madisonville: Ed Carroll (270) 824-7529
Morehead: Bob Wells (606) 784-6635
Paducah: Vince Priddle (270) 898-8468

For More Information Contact:

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Frankfort, KY 40601
Phone: (502) 564-3410
Fax: (502) 564-2741
E-mail: tom.gabbard@ky.gov

Federal and State KPDES Storm Water Permit Requirements

EPA regulations at 40 CFR 122.26(b)(14)(x) and 122.26(b)(15) require NPDES storm water discharge permit coverage for discharges from construction activities that disturb one or more acres. These nationwide regulations are implemented by general NPDES permits, which are issued by EPA and authorized State agencies such as the Kentucky Division of Water, which issues KPDES permits.

The KDOW KPDES Construction General Permit was developed to satisfy federal storm water permitting requirements. KPDES Construction General Permit meets all federal permit requirements and most of the requirements of local governments in Kentucky, though some local governments have additional requirements that must also be addressed by the applicant. See below for a summary of the KPDES Construction General Permit requirements, and Appendix B for a summary of some local government requirements.

The KPDES Construction General Permit covers all storm water discharges associated with construction activity that disturbs one acre or more. A copy of this permit can be downloaded from <http://www.water.ky.gov/permitting/wastewaterpermitting/KPDES/storm/>. The permit requires all construction activity in Kentucky disturbing one acre or more to:

- Submit a signed Notice of Intent (NOI) form to Kentucky Division of Water at least 48 hours before construction activity begins.
- Submit a copy of the NOI to the municipal operator of any municipal separate storm sewer system (MS4) the site discharges into.
- Develop and implement a “Storm Water Pollution Prevention (BMP) Plan.”
- Continue to implement the plan during construction activity, including inspections every 7 days and after each rain of one-half inch or more.
- Submit a signed Notice of Termination (NOT) form to Kentucky Division of Water after the site has been finally stabilized.

The Storm Water Pollution Prevention or “Best Management Practices” (BMP) Plan must be developed in accordance with good engineering practices. The BMP Plan must identify expected sources of pollution and describe how they will be controlled. The BMP Plan must be completed prior to construction, signed, and kept onsite. BMP Plans required by this permit are considered reports that shall be made available to the public, upon written request, in accordance with Section 308(b) of the Clean Water Act (CWA). Deficient plans may require modification upon notification by the KY Division of Water or local regulatory authority.

Construction site BMP Plan requirements

The BMP Plan must include, as a minimum, the following:

Site Description: The BMP Plan shall include a clear description of the nature of the construction activity, the order of major soil disturbing activities, a site map, and other information. The site map shall indicate drainage patterns and show approximate slopes after grading, areas of disturbance, the location of control measures, surface waters or wetlands, and storm water discharge locations.

Sediment and Erosion Control Measures: The BMP plan must include a clear description of what sediment and erosion control measures will be used and when they will be implemented. The following control measures shall be used as a minimum:

- **Soil Stabilization Practices**—Existing vegetation shall be preserved where possible. All disturbed areas of the site shall be stabilized. Stabilization shall begin within 14 days on areas of the site where construction activities have permanently or temporarily (for 21 days or more) ceased. When snow cover causes delays, stabilization shall begin as soon as possible. Stabilization practices include seeding, mulching, placing sod, planting trees or shrubs, and using geotextile fabrics and other appropriate measures.
- **Perimeter Structural Practices**—Silt fences or other equivalent structural practices shall be used on all side and down slope borders of the

site. For common drainage locations that serve more than ten (10) disturbed acres at one time, a sediment basin must be used if possible.

Structural practices include protecting drain inlets and outlets and using silt fences, earthen dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, reinforced soil retaining systems, gabions, sediment basins and other appropriate measures.

- **Storm Water Management Devices—**Management devices shall be installed during construction to control the pollutants in storm water discharges that will occur after construction has been completed. Velocity dissipation devices shall be placed at discharge locations and along outfall channels as necessary to provide a non-erosive flow. The goal should be 80% removal of Total Suspended Solids that exceed predevelopment levels. If this goal is not met, the permittee shall provide justification for refusing each device based on site conditions.

Other Control Measures: No solid materials, including building materials, shall be discharged to waters of the Commonwealth, except as authorized by a Section 404 permit. Off-site vehicle sediment tracking and dust generation shall be minimized. Waste disposal methods and sanitary sewer or septic systems shall comply with applicable state or local regulations.

Other State or Local Plans: The BMP Plan shall include any requirements specified in sediment and erosion control plans, storm water management plans or permits that have been approved by other state or local officials.

Maintenance: The BMP Plan shall include a clear description of the maintenance procedures necessary to keep the control measures in good and effective operating condition.

Inspections: Qualified personnel shall inspect all storm water control measures and drainage features at least once every seven days and within 24 hours of the end of a storm that is 0.5 inch or greater (0.1 inch for KYTC projects). Discharge locations shall be inspected to ensure that velocity dissipaters prevent significant impacts to receiving waters. Vehicle exits

shall be inspected for evidence of offsite sediment tracking. Disturbed areas and material storage areas that are exposed to precipitation shall be inspected for evidence of pollutants entering the drainage system. A signed report summarizing the scope of the inspection, major observations, and any corrective actions taken shall be made and kept as part of the BMP Plan.

Non-Storm Water Discharges: The BMP Plan shall identify and ensure the implementation of appropriate pollution prevention measures for any non-storm water component of a discharge as listed in PART III C, except for flows from fire fighting activities.

Contractors and Subcontractors: The BMP plan shall clearly state the contractor or subcontractors that will implement each control measure identified in the BMP Plan. All contractors and subcontractors identified in the BMP Plan must sign a copy of the certification statement below before conducting any professional service at the site: “I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.” The certification must include the name and title of the person providing the signature, the name, address, and telephone number of the contracted firm, the address, or other identifying description of the site and the date the certification is made. All certification statements must be included in the BMP Plan.

ESC Plan Requirements for Local Governments in Kentucky

Some urban areas in Kentucky have specific requirements for filing earth disturbance plans prior to construction. Check with each local government prior to construction in urban areas to make sure your understanding of the permit requirements is up-to-date. Below is a summary of the requirements of the Metropolitan Sewer District of Louisville and Jefferson County, the Lexington-Fayette Urban County Government, and Sanitation District #1 in Northern Kentucky.

Louisville – Jefferson County Metropolitan Sewer District

On November 21, 2000 the Jefferson County Fiscal Court adopted an Erosion Prevention and Sediment Control (EPSC) Ordinance applies to all land disturbing activities in Jefferson County, including single family, commercial, residential and utility construction. Activities disturbing 5,000 square feet or less and not requiring a building permit, limited private development site investigations, and surveying prior to plan application are exempt.

The EPSC Ordinance requires that all EPSC measures be designed and installed to accomplish an 80% design removal efficiency goal for total suspended solids. The MSD Design Manual, Standard Drawings and Standard Specifications contain approved structural and non-structural Best Management Practices (BMPs) for use in achieving this standard. Structural BMPs include sediment trapping devices, inlet protection measures, perimeter controls and construction entrances. Non-structural methods include phasing a project into manageable pieces, scheduling activities within each phase to minimize amount of disturbed area and provisions for temporary and final stabilization. The Permittee, or his or her designee, is required to conduct inspections of all EPSC measures and perform any modifications, maintenance or repairs as necessary, every 7 calendar days and within 24 hours of each storm event that produces 0.5 inches or more of precipitation. Records of these inspections must be kept on site at all times for review by the appropriate compliance enforcement

agency. For more information, visit the MSD web site at <http://www.msdlouky.org/insidemsd/epsc.htm>

Lexington-Fayette Urban County Government

An erosion and sediment control plan must be approved by the LFUCG before construction commences for any disturbed area other than the construction of a single family, two family, or townhouse residence. The plan shall be developed and signed by a professional engineer or landscape architect licensed in Kentucky. All hydrologic, hydraulic, structural, and geotechnical design work included in the plan must be done and signed by a professional engineer licensed in Kentucky. Plans must integrate nonstructural and structural practices and procedures to control erosion and sediment loss. Once the erosion and sediment control practices have been constructed, a grading permit can be obtained. The erosion control permit remains in effect throughout the construction project, including the homebuilding phase of construction for residential subdivisions. Land disturbances for the construction of a structure on a single residential lot are permitted through the building permit process and must comply with LFUCG requirements.

An operation and maintenance plan must be developed which provides a schedule for inspection, maintenance and repair of BMPs during construction activities. A maintenance schedule shall also be provided to ensure that permanent measures such as vegetation are properly established after construction is complete. All erosion and sediment controls which are identified in the ESCP shall be inspected and maintained. Any erosion and sediment control devices which are damaged shall be repaired or replaced immediately. For more information, see <http://www.lfucg.com/Engineering/> and the storm water manual at <http://www.lfucg.com/engineering/engmansw.asp>.

Sanitation District # 1 in Northern Kentucky

Sanitation District # 1 (SD1) serves 33 communities in Boone, Campbell, and Kenton Counties of Northern Kentucky. SD1 has established a “Land Disturbance Permit” to control storm water runoff from construction sites and post-construction storm water management for new developments and re-developments in Boone, Campbell, and Kenton Counties

and the municipalities in those counties in the area covered by the KPDES SMS4 Storm Water Permit with the exception of the city of Florence. The regulations require the implementation of proper erosion and sediment control practices; controls for other wastes; and the implementation of post-construction runoff controls in areas undergoing development or re-development. These regulations require review of improvement plans for new developments and re-developments; site inspections and enforcement activities of control measures; long-term operation and maintenance of post-construction controls; and sanctions to ensure compliance.

The requirements apply to all land disturbing activities and all development or re-development activities that disturb an area greater than or equal to one acre. Sites that are smaller than one (1) acre may also be covered by these regulations if they are a part of a larger common plan of development or sale. Persons responsible for a land disturbing activity, development activity, or redevelopment activity shall make application to the District. The land disturbing activity, development activity, or re-development activity cannot commence until the District has issued a Land Disturbance Permit. Drawings of the site with information on drainage, erosion and sediment controls to be used, and other details are also required. For more information, see <http://www.sd1.org/StormWater/SWRules&Regs.html>.

Other Phase II Storm Water Cities

Cities in Kentucky with more than 10,000 population (e.g., Bowling Green, Henderson, Madisonville, Elizabethtown, Winchester, Richmond, Georgetown, Somerset, etc.) are subject to KPDES permits under the Kentucky Phase II Storm Water Program. Regulations are similar to those of larger cities—all construction sites of one acre or more must have written erosion and sediment control plans, controls must be inspected every seven days or after rains of one-half inch or more, controls must be removed after the site is stabilized, etc. For more information on the permit process, see <http://www.water.ky.gov/permitting/wastewaterpermitting/KPDES/storm/>. For regulatory information, see <http://www.lrc.state.ky.us/kar/401/005/002.htm>.

Section 404 Permits for Work in Regulated Waters

Section 404 of the Clean Water Act regulates the placement of dredged or fill material into the waters of the U.S., including small streams and wetlands adjacent or connected to regulated waters (see Section 12). The U.S. Army Corps of Engineers (USACE) administers the permit program dealing with these activities, in cooperation with the U.S. Environmental Protection Agency (USEPA). Individual permits are issued for activities with significant impacts, and nationwide or regional general permits are issued for activities with impacts not deemed to be significant.

For minor activities covered under Section 404 general permits (e.g., road culvert installation, utility line activities, bank stabilization, etc.), permit requirements are typically deemed to be met if activities result in only short-term, limited effects and if all appropriate and reasonable measures related to erosion and sediment control, project seeding and stabilization, and prevention of water quality degradation (e.g., working during low-flow conditions) are applied and maintained. Applicants will be responsible for ensuring that erosion and sediment control measures are selected, installed, and maintained properly. For more information, see <http://www.water.ky.gov/permitting/wqcert/>.

Contact information for USACE District Offices serving Kentucky:

Huntington District

502 8th Street, Huntington, WV 25701-2070

Tel: 304-529-5487 Fax: 304-529-5085

Website: www.lrh.usace.army.mil

Louisville District

PO Box 59, Louisville, KY 40401-0059

Tel: 502-315-6675 Fax: 502-315-6677

Website: www.lrl.usace.army.mil

Memphis District

Clifford Davis Federal Building, Room B-202,
Memphis, TN 38103-1894

Tel: 901-544-3471 Fax: 901-544-0211

Website: www.mvm.usace.army.mil

Nashville District

3701 Bell Road, Nashville, TN 37214

Tel: 615-369-7515 Fax: 615-369-7501

Website: www.orn.usace.army.mil

Kentucky CWA Section 401 Water Quality Certification

Anyone proposing to conduct activities that result in physical disturbances to wetlands or streams will need a Water Quality Certification (WQC) under Section 401 of the Clean Water Act to ensure that Kentucky Water Quality Standards will not be violated (see Section 12). Projects which involve the discharge of dredged or fill materials into waters of the United States, including wetlands, are regulated by the U.S. Army Corps of Engineers under Clean Water Act Section 404 and require Section 401 WQC.

Examples of activities which may require a Section 404 permit and Section 401 water quality certification include: stream relocations, road crossings, stream bank protection, construction of boat ramps, placing fill, grading, dredging, ditching, mechanically clearing a wetland, building in a wetland, constructing a dam or dike and stream diversions.

In Kentucky, the Water Quality Certification Section in the Water Quality Branch is responsible for implementing the Section 401 program. For wetland-related impacts involving greater than one acre of wetland loss, the applicant should follow the Wetland Mitigation Requirements when applying for a WQC. Wetland losses involving less than one acre may be regulated by the U.S. Army Corps of Engineers. The U.S. Army Corps of Engineers is responsible for making official, jurisdictional wetland determinations.

For stream-related impacts that involve more than 200 linear feet of stream disturbance, the applicant should submit detailed plan and profile drawings along with the application (see draft Stream Mitigation Guidelines on web site below). Impacts in streams or lakes designated as Special Use Waters require an individual WQC and special attention should be paid to the sediment and erosion control plan. For more information, see <http://water.nr.state.ky.us/wq/wqcertification/index.htm>.

Floodplain Construction Permits

The Kentucky Division of Water Floodplain Management Section has the primary responsibility for the approval or denial of proposed construction and other activities in the 100-year floodplain of all streams in the Commonwealth. Typical activities permitted are dams, bridges, culverts, residential and commercial buildings, placement of fill, stream alterations or relocations, small impoundments, and water and wastewater treatment plants.

Applicants must submit a completed application with a location map, plans of the proposed construction, and the addressing of public notice. If the proposed construction lies in an area where there is no existing floodplain information, hydrologic and hydraulic analysis must be performed.

KDOW engineers will perform the required analysis provided the Applicant supplies them with the floodplain geometry in the form of cross sections, preferably tabulated on an Excel Spreadsheet. This analysis determines the effects the proposed construction has on existing flood conditions and determine the expected 100-year flood heights and the delineation of the floodway (a portion of the natural floodplain that is restricted to little or no construction).

From this analysis, construction limits for fills and buildings and required elevations for finished floors or floodproofing can be provided. For all construction, especially bridges and culverts, a check is made to ensure that the project has only minimal impacts on existing flood levels. Regulations limit the effect to a maximum of one foot. For more information, see <http://water.ky.gov/permitting/floodconstr/>.

Additional Details for Transportation Projects

The Kentucky Transportation Cabinet (KYTC) requires inspection and documentation of all controls weekly or after each rain of 0.1 inch or more. Approved curled wood fiber or straw/coconut fiber erosion control blankets or mats must be used in all ditches (except sodded, paved, and channel-lined ditches) and on all slopes of 4:1 or steeper, if upland drainage area exceeds 100 feet. KYTC will allow the use of hydromulch in lieu of straw during March 1 to May 15 and September 1 to November 1 only. Use sufficient quantities of mulch and tackifier to promote germination and control erosion until vegetation is established.

Projects conducted within the jurisdiction of a “Storm Water Phase II City” (see Appendix B) should coordinate activities with local storm water programs.

KYTC requires an erosion control plan prior to excavation or grading. Erosion control plans require site drawings that show natural and constructed drainage features and the actions that will be taken to control both erosion on bare soil areas and sediment in sheet runoff or concentrated flows. Erosion and sediment control actions must be indicated on the site drawing. Natural streams and other surface waters should also be noted.

Plans must indicate temporary and permanent erosion control features. At a minimum, this includes silt checks, silt traps, sediment traps/basins, silt fences, and other methods. Streams, wetlands, and other surface waters should be disturbed only when necessary, and as little as possible. Temporary stream crossings should be designated. Erosion and sediment controls must be properly maintained during construction and closed out after construction to ensure continuing compliance with the permit and KYTC requirements. See Section 11 for maintenance information, and Section 12 for information on closeout.

Specific design and other requirements can be found in the project contract documents.

Erosion/Sediment Control

Site Inspection Checklist

Kentucky Erosion Prevention and Sediment Control • Construction Site Inspection Checklist

EPSC Practices	Field Indicators for Compliance
Project Operations	<p>Grading and clearing conducted in phases and according to plan to minimize exposed soil areas</p> <p>No vegetation removal or other operations in stream or sinkhole buffer zone (25-50 ft. min.)</p> <p>Rock construction entrance/exit in place where vehicles enter paved roads</p> <p>No sediment, mud, or rock on paved public roads in project area</p> <p>Dust control if needed when working in residential areas during dry conditions</p> <p>Inspection of all controls weekly and after each rain exceeding ½ inch during construction</p>
Drainage Management	<p>Upland runoff diverted around or through bare soil areas below with lined ditches or grassed berms</p> <p>Drainage channels exiting the site are seeded & stable, with no muddy flow after rains</p> <p>Discharges from dewatering operations cleaned in silt fence enclosure or filtered</p> <p>No unmanaged muddy runoff leaving site after rains up to 1½ inches</p>
Erosion Protection for Bare Soil Areas	<p>Exposed soil areas seeded after two weeks if no work is planned for next 7 days</p> <p>Soils on flat ground or moderate slopes seeded at approved rate</p> <p>Soils on steep slopes stabilized with seed and mulch and/or other erosion control products</p>

EPSC Practices	Field Indicators for Compliance
Sediment Filters	<p>Silt fence, rock filter, or other sediment control below all bare soil areas</p> <p>Sediment filter installed across slope on the contour, trenched in, posts on downhill side</p> <p>Silt fence posts are 6 feet apart or closer; ends of fence turned uphill</p> <p>Multiple sediment filters 110 feet or less apart on unseeded slopes steeper than 4:1</p> <p>J-hook interceptors along silt fence where muddy runoff flows along fencing</p> <p>No visible undercutting or bypassing of sediment filter, failures found and repaired promptly</p>
Slope Protection	<p>Slopes tracked, disked, or conditioned after final grade is established</p> <p>Slopes seeded, mulched, or covered with blankets within 21 days, no unmanaged gullying</p> <p>Heavy downslope flows controlled by lined downdrain channels or slope drain pipes</p> <p>No gullies, no muddy runoff from slopes entering streams, rivers, lakes, or wetlands</p>
Inlet Ponding Dams	<p>Ponding structure located at storm drain, culvert, and channel inlets receiving muddy flows</p> <p>No visible undercutting, overtopping, or bypassing of inlet ponding structure</p> <p>Accumulated sediment is less than halfway to the top of the ponding structure</p>
Outlet Protection	<p>High flow discharges have rock or other flow dissipaters of adequate sizing at outlet</p> <p>Channel and culvert outlet areas show no visible signs of erosion, bank failure, or collapse</p> <p>Outlet discharging to lined, stable ditch or vegetated area</p>

Kentucky Erosion Prevention and Sediment Control • Construction Site Inspection Checklist (continued)

EPSC Practices	Field Indicators for Compliance
Ditch Stabilization	<p>No unmanaged ditch bank erosion or bottom scouring visible within or below site</p> <p>Ditches with slopes greater than 3% have silt checks, spaced closer as slope increases</p> <p>Ditches with slopes up to 3% are thickly seeded with grass</p> <p>Ditches 3% to 10% are lined with thick grass and erosion control blankets</p> <p>Ditches 10% to 20% are lined with thick grass and turf mats or other approved product</p> <p>Ditches exceeding 20% are lined with rock, concrete, or other approved erosion control products</p>
Sediment Traps and Basins	<p>Storage volume is at least 134 cubic yards for each acre of bare soil area drained</p> <p>Outlet structure is stable and consists of rock lined overflow or outlet riser pipe</p> <p>Rock overflow has 6" depression to control discharges; discharge area is stable</p> <p>Outlet riser pipe has concrete & rock base, ½ inch holes every 3" to 6", and trash rack</p>
Maintenance of EPSC Management Practices	<p>Sediment behind silt fence and other filters does not reach halfway to top</p> <p>Sediment traps and basins are less than half full of sediment</p> <p>Gullies noted and repaired, silt fences and other controls inspected and repaired/replaced</p> <p>Written documentation of controls installed, inspection results, and repairs performed</p> <p>All controls removed and control areas graded, seeded, and stabilized before leaving site</p> <p>Regulatory requirements for storm water permitting, etc. addressed as needed</p>

Kentucky Construction Site Inspection Report

Kentucky Erosion and Sediment Control Permit Compliance Inspection Report

General Site Information:

COMPANY:	COUNTY:
SITE:	DATE:

Permit Compliance Information:

Copy of permit kept on site	Yes	No
Copy of Best Management Practices (BMP) Plan kept on site		
Site specific description of project timing/phasing and implementation		
Adequate site map showing:		
• Drainage patterns indicated on plan		
• Receiving waters (stream, river, lake, wetland, etc.) named		
• Approximate slopes after major grading		
• Area of soil disturbance		
• Undisturbed areas and vegetative buffer zones		
• Location of structural and non-structural controls (BMPs)		
• Areas where stabilization practices are to be employed		
• Storm water discharge locations		

Specific Site Information:

Name of receiving stream:	
Total area of site:	
Area disturbed:	

Inspection Results:

Inspection Criteria: Satisfactory, Marginal, Unsatisfactory	S	M	U
Condition of receiving stream			
Is BMP Plan adequately implemented?			
Timely seeding and mulching			
• Revegetation on cut/fill/cleared areas			
• Condition of slope areas			

Structural Controls			
• Drainage ditch protection/liners installed			
• Inlet protection for curb drains, etc.			
• Outlet protection—no erosion or scour			
• Silt fences below bare soil areas			
• Rock check dams in ditches			
• Sediment traps/ponds maintained			
• Other controls			
Other Controls			
• Secondary containment for fuel; maintenance area designated			
• Proper disposal of concrete wastes; wash in designated area			
• Other (non-storm water discharge, etc.)			
• Off-site tracking of sediment prevented			
Compliance with State and Local Regulations			
• Waste, fertilizer, paint, pesticide/herbicide storage and disposal			
• Proper sewage management			
Operation and Maintenance of BMPs			
• Maintenance plan incorporated into written BMP Plan			
• Maintenance plan followed			
• Maintenance documented			
• Inspections done as required and documented			
• Inspection reports completed and maintained on site, in file			
Contractor Certification on File			
Plan Certification on File			

Comments:

Inspector’s Signature

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